Math 404 HW 5 Spring 2024. Due Tuesday, Feb. 27.
**1 page, 6 questions**

1) Suppose there is a deductible $d = 200$ and a maximum payment of 800, so losses are censored at 1000. Suppose the data (including the deductible) are 250, 400, 500, 750, 900, 1000, 1000. Assume an exponential distribution is fit to this data. In homework 4 3b), you showed that the MLE $\hat{\theta} = 680 = 1/\hat{\lambda}$. Now show this result using the formula from Exam 2 review 78 a).

2) You believe that a Poisson distribution, with a mean of $\lambda$, reflects the number of claims per policy each year. You observe how many claims occur under each of three policies during a year, and compile the following observation data:

| Claims per Policy | Number of Observations |
|---|---|
| 0 claims | 2 |
| 1 or more claims | 1 |

In homework 4 you showed that the MLE of $\lambda$ was 0.4055. Now get the MLE using the Bernoulli technique.

3) C14: The information associated with the MLE of a parameter $\theta$ is $4n$, where $n$ is the number of observations. Calculate the asymptotic variance of the MLE of $2\theta$.
Hint: $Var(2\hat{\theta}) = 4Var(\hat{\theta})$, so the delta method is not needed.

4) C277 modified: Losses follow an EXP($\theta$) distribution. The losses are 100, 200, 400, 800, 1400, 3100.

a) Use the delta method to approximate the variance of the maximum likelihood estimator of $S(1500)$.

b) Find a 95% confidence interval for $g(\theta) = S(1500)$.

5) Suppose $X \sim U(0, \theta)$ with 98 observations below 17 and two observations above 17. Find the MLE of $\theta$.

6) You are given a sample of 100 losses from an exponential distribution. 62 are less than 1000 and 38 are more than 1000. Find the MLE of $\theta$.